
Recent Marshall Space Flight Center Natural Environments Branch Terrestrial & Planetary Environments Team Activities

August 2016 Natural Environments
Day-of-Launch Working Group Meeting

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MSFC Natural Environments Branch/EV44



Exploration Mission-1 (EM-1) Support

- EM-1 Launch planned for late 2018
- There are three programs under the Exploration Systems Development Division (ESD) at NASA HQ working toward the launch
 - Space Launch System (SLS)
 - Orion Multi Purpose Crew Vehicle (MPCV)
 - Ground Systems Development and Operations (GSDO)
 - Also, ESD has a Cross-Program function to ensure all the programs are integrated for the EM-1 launch

ESD Natural Environment Cross-Program Function

Cross-Program Natural Environments Integration Ad-Hoc Team

SLS-SPEC-159 Cross-Program Design Specification for Natural Environments (DSNE)
SLS-SPEC-044-07 Cross-Program Vehicle Design Environments Vol. 7: Natural Environments

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ESD

Point of
Contact
(MSFC)

GSDO

Natural
Environments
Lead
(KSC)

MPCV

Orion

Natural
Environments
Lead
(MSFC)

SLS

Natural
Environments
Lead
(MSFC)

Exploration Systems Development (ESD)
Ground Systems Development and Operations (GSDO)
Marshall Space Flight Center (MSFC)
Multi-Purpose Crewed Vehicle (MPCV)
Space Launch System (SLS)

Cross-Program Support Activities

- Developed draft version of the weather section of the Exploration Mission 1 (EM-1) Launch & Recovery Program Requirements Document
- Developed verification and validation (V&V) strategy for cross-program natural environments to support closure of SLS CDR RID
 - SLS-SPEC-044-07 Cross-Program Vehicle Design Environments Vol. 7: Natural Environments is currently being updated to include V&V information
 - SLS-SPEC-159 Cross-Program Design Specification for Natural Environments (DSNE) is going to be updated with V&V information in late 2016

SLS Support Activities

- Supported review of natural environment related OMRs and hazard reports for SLS
- Reviewed design discrete gust magnitudes and implementation methodology for SLS dynamic load assessments. Discrete gust implementation was determined to be under conservative. Future assessments will utilize continuous turbulence forcing functions.
- Provided launch availability assessment of various liftoff ground wind constraints for SLS Block 1B
- Provided recommendation for SLS liftoff ground wind LCC evaluation. Recommendation is to use the four heights on the Lightning Protection System towers at Pad 39B
- Provided support to the Day-of-Launch Initialization-Load Update (DOLILU) development activities

Orion MPCV Support Activities

- Supported Orion CDR
 - Request for Action (RFA) closeouts continued into 2016
- Supported European Service Module (ESM) CDR
 - Some Orion CDR RFAs remained open until this CDR was completed
 - ESM plans to implement SLS-SPEC-159 DSNE Rev. D design criteria after CDR
 - Currently using Rev. C
- Provided Thermal Protection System (TPS) charging analysis guidance.
 - Leading discussions on analysis for new tape-like coating
- Performed an analysis of cold air temperatures within the nominal and off-nominal landing footprints for a Roll Control System valve sensitivity study

Other Activities

- Earth Global Reference Atmosphere Model (GRAM) version 2016 to be released later this year
 - Primary update is code change from FORTRAN 90 to C++
- In the process of updating Mars & Venus GRAM's
 - Updating global circulation model data used in the code
- Continued archival (quality control) of terrestrial data from KSC/Eastern Range
 - Primarily consisting of data passed through the Range External Interface Network (REIN)
 - Looking into new data formats to replace the old MDTF format